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GAV 1754

0211/214

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s) : TOMBS, Michael et al.
Serial No. : 10/044,798
Filing Date : January 10, 2002
Examiner : LAMB, Brenda
Title : NOZZLE FOR SOLDERING
APPARATUS
Group Art Unit : 1734

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SUPPLEMENTAL RESPONSE

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In further response to the Office Action dated May 6, 2003, and to supplement the Amendment filed November 6, 2003, Applicants have the following comments and remarks.

In the first place, it is unclear from reviewing the Office Action dated May 6, 2003 that the Examiner considered the Information Disclosure Statement filed on March 31, 2003. Applicants request that the Examiner consider this Information Disclosure Statement and make of record the references identified therein. Applicants note that the Information Disclosure Statement was filed prior to the first substantive Office Action, and was timely filed under 37 C.F.R. Section 1.97 (c) with submission of the appropriate government filing fee.

In the May 6th Office Action, the Examiner objects to Claims 1-3 as being

confusing since it is, according to the Examiner, unclear whether the claimed "surface which is wetted by the solder" is part of the substrate/circuit board or the reservoir/nozzle. In response, Applicants note that objected claims 1-3 have been cancelled along with all other filed claims and new claims 8-15 have been presented for consideration. Moreover, in response to the Examiner's query as to whether the wetted surface recited in the claims is part of the solder board or the like, the answer is no and it is Applicants contention that the newly presented claims address the Examiner's concerns in that they clearly define the invention.

Before turning to the Examiner's prior art rejection, Applicants note that the invention overcomes the problem of solder bridging between adjacent leads when dip soldering a component or circuit board. In accordance with the invention, during the dipping operation, a plate or other member which is wetted by the solder is positioned between the leads which are being soldered. After sufficient solder is provided to the joints being soldered, typically by having the circuit board brought down onto the solder surface with the plate or other member lying below the solder surface during dipping, the solder surface is then lowered below the upper edge of the plate or member, thereby drawing the solder away from the joints and reducing the likelihood of solder bridging. Alternatively, the plate or member may be raised with the board as the board is lifted away from the solder surface, serving to break the solder surface and thereby draw solder towards the plate, also reducing the likelihood of solder bridging.

Turning now to the prior art rejections, the Examiner rejected filed claims 1-2 as being anticipated by the Patent reference to Zimmerman. The Examiner relies on the teaching of Zimmerman with respect to FIGS. 8 and 8A therein, which he contends describes a reservoir 115 with solder and leads from an electrical board. The Examiner also rejects filed claims 1-5 as anticipated by the teaching in the patent to Kent, which he states describes a solder apparatus comprised of a plurality of nozzles/short tubes with a taper and which are used to direct the solder toward the surface of a terminal lead from a circuit board. The Examiner further rejects dependent filed claims 3-4 as obvious based on the combination of teachings in Zimmerman and

Kent. The Examiner admits that Zimmerman fails to disclose a soldering applying means in the form of a nozzle, but that it would have been obvious by one of skill in the art to modify the nozzle shown in Kent in order to be used in the Zimmerman design.

These rejections are respectfully traversed.

In the Zimmerman patent, solder is contained in a cup-like compression 115 lined with steel 117 to enable solder contained therein to wet the walls of the cup. In the first place, the teaching in Zimmerman teaches away for the problem of solder bridging -- the wetted surface described in Zimmerman is for the purpose of preventing the occlusion of flux and gases that would otherwise interfere with proper soldering operation; it has nothing to do with reduction in solder bridging.

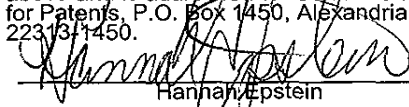
Perhaps more importantly, in order to clearly distinguish from the teaching in Zimmerman, new independent claims 8 and 9 specifically state that a wetted surface is provided by a plate or member so as to project between adjacent leads of the component or board that is being soldered. Claim 8 states that "the plate is positioned and dimensioned so that adjacent component leads to be soldered pass to each side of the plate edge" and claim 9 states that the nozzle includes a member at the nozzle outlet having a surface which is wetted by the solder and is "positioned so as to be straddled by two adjacent leads of a component to be soldered." The feature of having the wetted surface of the plate or member disposed between adjacent leads is neither taught nor suggested by the Zimmerman patent.

The Kent reference is of little relevance since it specifically calls for a "non-wetted surface (see column 4, lines 15-26). Moreover, there would be no motivation to combine the wetted surface 117 of cup member 115 in Zimmerman with Kent since Kent calls for a "non-wetted surface." Further, and specifically with regard to new claim 9, in which the claimed apparatus is defined as including a nozzle having an outlet through which the solder flows, both Zimmerman and Kent teach away from this feature. Both Zimmerman and Kent are particularly concerned with static solder

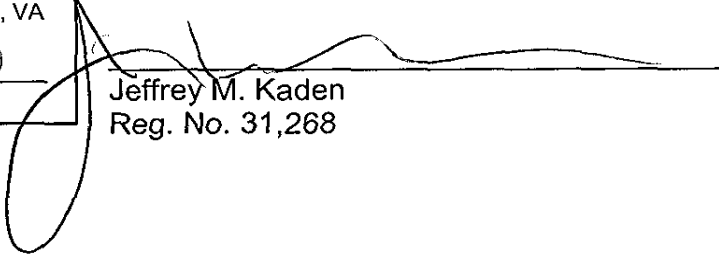
systems (See Zimmerman at column 10, lines 23-25 - "the rim of the cup presents a non-wetting surface which prevents easy flow of the solder over the rim," and Kent at column 4 line 24-26 -- "the solder streams do not flow over the sides of the housings." Accordingly both the Zimmerman and Kent patents are of minimal relevance as to claim 9 and all claims which depend therefrom.

In view of the above, Applicants submit that newly presented claims 8-15, all the claims now pending in this application are distinguishable from the teachings in the prior art, including the references to Zimmerman and Kent whether taken alone or in combination, and are otherwise directed to allowable subject matter.

Early and favorable action is respectfully requested.

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Respectfully submitted,
GOTTLIEB, RACKMAN & REISMAN, P.C.
Attorneys for Applicant(s)
270 Madison Avenue, 8th Floor
New York, New York 10016
(212) 684-3900


Jeffrey M. Kaden
Reg. No. 31,268

Dated: New York, New York
November 12, 2003